It is to be regretted that fuller credit for most of the apparently new ideas is not assigned. One looks in vain for acknowledgment of the works of FRÜH and SCHRÖTER, GANONG, and TRANSEAU, whose studies have partially covered the significant results of DAVIS. The mention of these works in their proper places would relieve the book of much that might appear to be an original contribution. The greatest value of the book to the ecologist lies in its careful descriptions of various types of swamps and the detailed record of the distribution of peat-forming species. A complete index makes this material readily available. —LEROY H. HARVEY.

Endodermis of ferns.—The sporadic occurrence of the endodermis and the modifications it shows have been frequently remarked. A comprehensive study of this layer in the fern stem and leaf has been made by BÄSECKE,[29] whose contribution may be considered a companion paper to that of RUMPF[30] on the fern root.

Following this writer, BÄSECKE distinguishes (1) the primary endodermis, characterized by Caspary's band, and (2) the secondary endodermis, in which the cell walls are more or less thickened and suberized. The leaves of the eusporangiate ferns lack an endodermis, while those of Osmundaceae show only a primary layer; but most of the leptosporangiate ferns are well provided throughout the length of the leaf with a secondary layer. Anatomical and physiological studies show that food manufactured in a fertile leaf first supplies the sporangia, and any excess passes out through the vascular bundles. In rhizomes devoted to storage, only a primary endodermis is found, and in those which are active in propagating the plant a more or less impenetrable layer extends nearly to the growing point; hence the view is maintained that the secondary endodermis serves to prevent the escape of food from the vascular bundles while it is in process of transport.

The second part of the paper describes a reinvestigation of the question as to the occurrence of cork in the ferns, and the conclusion is reached that true cork is never present, but that substitutes are frequent, such as "metacutinized" walls of the outer cell layers. In this respect the ferns are less differentiated than the angiosperms. As to shedding of leaves, the author distinguishes three sorts of abscis layers, in contrast to earlier workers who were unable to find special structures connected with leaf fall. A classification of the various mechanical tissues of ferns concludes the paper.—M. A. CHRYSLER.

Protection from light.—BAUMERT reviews very fully[31] the many suggestions that appear in literature as to the function of various structures in protecting

[29] BÄSECKE, PAUL, Bieträge zur Kenntniss der physiologischen Scheiden der Achsen und Wedel der Filicinen, sowie über den Ersatz des Korkes bei dieser Pflanzengruppe. Bot. Zeit. **66**:25–87. *pls. 2–4.* 1908.

[30] RUMPF, G., Rhizodermis, Hypodermis, und Endodermis der Farnwurzel. Bibl. Botan. **62**:1904.

[31] BAUMERT, K., Experimentelle Untersuchungen über Lichtschutzeinrichtungen an grünen Blättern. Beitr. Biol. Pfl. **9**:83–162. *figs. 6.* 1907.

mesophyll cells from excessive light, and made exact measurements as to the efficiency of some of them. Light from a lamp, concentrated by a reflector, was allowed to fall upon the experimental leaves at an angle of 45° in a suitable moist chamber, and the differences measured by means of a thermocouple of needle form, inserted between two pieces of the leaf, and connected with a galvanometer. The cooling by evaporation as a source of error during the exposure (10–15 min.) could not be wholly avoided, but was assumed to be nearly uniform in the control and the experimental leaves.

The results show that hairy, scaly, shining, and glaucous leaves become less heated than the same leaves deprived of protection. A thick white coating of hairs, as in *Centaurea candidissima*, reduces the heating effect 37.5 per cent., shininess up to 30 per cent., and wax coating up to 13.6 per cent. A layer of water reduces it 19.2 per cent.; but this result seems more open to objection on the score of cooling by evaporation than the others, though the author takes it to be as valid as the rest. Reflection is held to be due in some Bromeliaceae to the inner epidermal wall, the cell acting like a concave lens, while epidermal cells that contain brown contents act as shades. The special value of the paper is in its application for the first time of quantitative methods, instead of deductive reasoning.—C. R. B.

Turgor and curvature.—The old problem has been again attacked by KERSTAN,[32] namely the question whether, under tropistic stimulation, there first occurs a variation in turgor that causes the curvature, both in growing parts and in motor organs. The evidence accumulating has been all against the idea, so far as concerns growth curvatures, and PFEFFER's result with Hordeum has stood almost alone. KERSTAN adds his testimony that in most cases there is no acceleration of geotropic and heliotropic growth movements by a heightened turgor, and often the cells of the convex side become less turgid. When such curvatures are mechanically prevented, no one-sided or opposed turgor changes occur. Only in the nodes of some grasses does turgor rise on the convex side by 0.5–2 per cent. KNO_3. This is partly due to the interference with growth, partly to geotropic induction. But the growth reaction occurs in 2.5 hours, and the turgor reaction only after 15. Hence the turgor change does not cause the growth reaction. The geotropic movements by motor organs, as has already been sufficiently proved, are due wholly to turgor. The movements coincide in time with the turgor reaction, which appears to be produced by the migration of soluble materials from the concave to the convex side. The turgor differences do not appear on the clinostat, but turgor increases on all sides. In Marantaceae, however, a very slightly heightened turgor was found in curved petioles, and none could be observed in the imperfect organs of Malvaceae.—C. R. B.

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[32] KERSTAN, K., Ueber den Einfluss des geotropischen und heliotropischen Reizes auf den Turgordruck in den Geweben. Beitr. Biol. Pfl. **9**:163–213. 1907.